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Acrogenospora hainanensis sp. nov. and new records of microfungi from southern China

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Abstract —*Acrogenospora hainanensis* is described and illustrated from specimens collected on dead branches in Hainan Province, China. The fungus is characterized by terminal, monoblastic, percurrently extending conidiogenous cells with solitary, spherical or subspherical, non-septate and relatively small conidia. *Acrogenospora gigantospora*, *Nakataea fusispora,* and *Pseudospiropes costaricensis* are newly recorded from China.

Key words — anamorphic fungi, taxonomy

Introduction

The forests of southern China have a rich mycota, and mycological investigations dealing with many new species have been published recently (Dai & Cui 2006, Cui & Dai 2008, Cui et al. 2009a,b, 2011, Zhang et al. 2009, 2011, Ma et al. 2010). During ongoing mycological surveys in the forests of Hainan and Guangdong provinces, four interesting anamorphic fungi clearly related to *Acrogenospora*, *Nakataea,* and *Pseudospiropes* were collected on dead branches. One of these is an undescribed species of *Acrogenospora,* while the other three species are new records for China.

Acrogenospora hainanensis Jian Ma & X.G. Zhang, **sp. nov.** Fig. 1

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Differs from *Acrogenospora verrucispora* in smaller smooth conidia and from *A. sphaerocephala* in smaller conidia and more narrow conidial scars.

Type: China, Hainan Province: Tunchang, on dead branches of unidentified broad-leaved tree, 12 April 2011, J. Ma (**Holotype** HSAUP H5509; **isotype** HMAS 146167).

Etymology: refers to the province where the type was found.

Colonies on the natural substratum effuse, black, glistening, hairy. Mycelium mostly immersed, composed of branched, septate, subhyaline to pale brown,

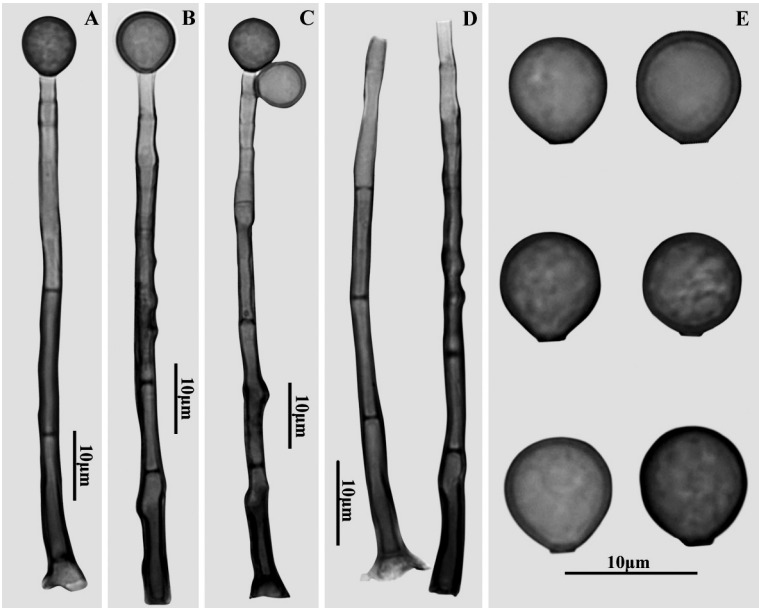

Fig. 1. *Acrogenospora hainanensis* (holotype). A–C. Conidiophores, conidiogenous cells with conidia. Note that in C the mature conidium is pushed sidewise following successive percurrent extension of the conidiogenous cells. D. Conidiophores. E. Conidia.

smooth-walled hyphae. Conidiophores macronematous, mononematous, single, unbranched, erect, straight or slightly flexuous, septate, smooth, brown to dark brown, paler towards the apex, 60–80 μm long, 2–3.5 μm thick. Conidiogenous cells monoblastic, integrated, terminal, cylindrical, smooth, pale brown, proliferating percurrently. Conidial secession schizolytic. Conidia solitary, acrogenous, dry, spherical or subspherical, smooth, brown, non-septate, 7.5–9.5 × 7–8.5 μm, with a truncate base 1.5–2 μm wide.

Comments — *Acrogenospora*, with *Monotospora sphaerocephala* Berk. & Broome [≡ *A. sphaerocephala* (Berk. & Broome) M.B. Ellis] as the type species, is characterized by integrated, terminal, monoblastic, percurrently extending conidiogenous cells on distinct, unbranched conidiophores, and acrogenous, solitary, non-septate conidia with schizolytic conidial secession. These characters separate the genus from *Domingoella* Petr. & Cif. (Petrak & Ciferri 1932), *Brachysporiella* Bat. (Batista 1952), and *Endophragmiella* B. Sutton (Sutton 1973). Ten species are currently included in *Acrogenospora*, all discovered on dead branches, rotten wood, or submerged bamboo (Ellis 1971, 1972, Hughes 1978, Goh et al. 1998, Zhu et al. 2005, Hu et al. 2010). The species are distinguished primarily on conidial shape, size, and ornamentation (Hughes 1978, Goh et al. 1998, Zhu et al. 2005).

Of the known species, *Acrogenospora hainanensis* is most similar to *A. sphaerocephala* (Ellis 1971) and *A. verrucispora* Hong Zhu et al. (Zhu et al. 2005) in the production of spherical or subspherical conidia. However, the new species differs from *A. verrucispora* (verrucose conidia 15–33 × 14–33 µm) in its smaller smooth-walled conidia and from *A. sphaerocephala* (19–21.5 µm diam., conidial scars 5–7 µm wide) in its smaller conidia and narrower conidial scars.

Acrogenospora gigantospora S. Hughes, New Zealand J. Bot. 16: 314, 1978. Fig. 2

Colonies on the natural substratum effuse, black, glistening, hairy. Mycelium mostly immersed, composed of branched, septate, pale brown, smooth-walled hyphae. Conidiophores distinct, single or in groups of 2–4, unbranched, erect, straight or slightly flexuous, septate, smooth, brown to dark brown, up to 265 µm long, 5.5–8.5 µm thick. Conidiogenous cells monoblastic, integrated, terminal, cylindrical, smooth, pale brown, with multiple percurrent extensions. Conidial secession schizolytic. Conidia solitary, acrogenous, dry, broadly obovoid to

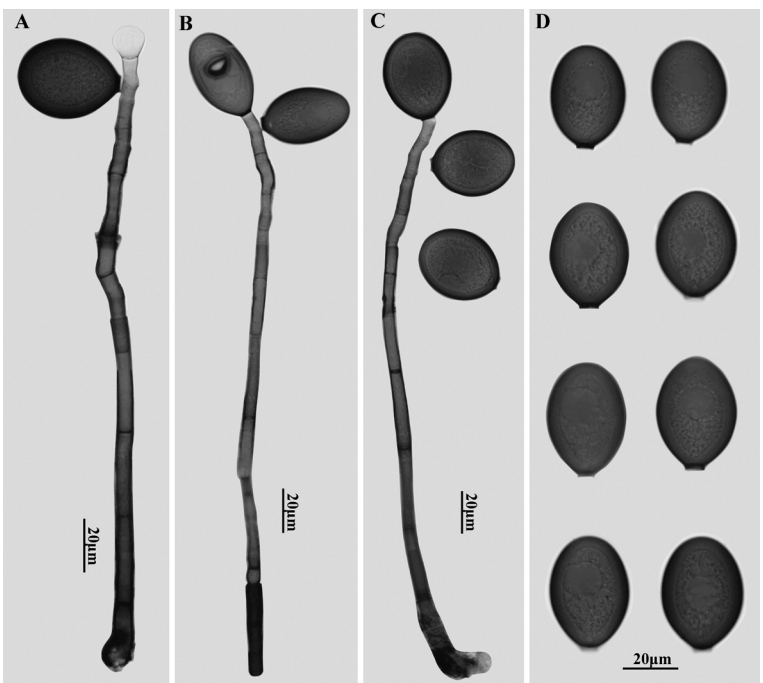

Fig. 2. *Acrogenospora gigantospora*. A–C. Conidiophores, conidiogenous cells with conidia. Note that in A and B the mature conidium is pushed sidewise following successive percurrent extension of the conidiogenous cells. D. Conidia.

subspherical, smooth, dark brown to black, non-septate, 37–42 × 24–30 μm, with a truncate base 5–7.5 μm wide.

Specimen examined: **China**, **Guangdong Province**: Chebaling National Nature Reserve, on dead branches of unidentified broad-leaved tree, 19 Oct 2010, J. Ma (HSAUP H5402).

Comments – *Acrogenospora gigantospora* is reported for the first time from China. Except for its shorter narrower conidiophores, our collection fits well with the original description of *A. gigantospora* (Hughes 1978; conidiophores ≤ 700 × 9–14.5 μm). *Acrogenospora gigantospora* appears to be most closely related to *A. ovalis* Goh et al. (Goh et al. 1998) in conidial shape but differs in having larger conidia and a wider conidial scar. In addition, mature *A. gigantospora* conidia are brown to dark brown while those of *A. ovalis* are mid orange-brown.

Nakataea fusispora (Matsush.) Matsush., Icon. Microfung. Matsush. Lect.: 100, 1975. Fig. 3

≡ *Vakrabeeja fusispora* Matsush., Microfungi Solomon Is. Papua-New Guin.: 66. 1971.

≡ *Pyricularia fusispora* (Matsush.) Zucconi, Onofri & Persiani, Micol. Ital. 13(2): 9. 1984.

Colonies on the natural substratum effuse, dark brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, smooth-walled hyphae. Conidiophores conspicuous, mononematous, unbranched, straight or flexuous, smooth, septate, brown, paler towards the apex, 64–95 μm long, 3.5–4.5 μm thick. Conidiogenous cells polyblastic, integrated, terminal becoming intercalary, sympodially proliferating, denticulate, thin-walled; denticles subcylindrical, flat and open at the apex, septate at the base. Conidia solitary, dry, apical and lateral, verruculose, fusiform, acute at the apex, with a denticle at the base, 3-septate, the cell at each end hyaline or very pale brown, central cells pale to mid brown; conidia 22–34 × 6–7.5 μm.

Specimen examined: **China**, **Hainan Province**: tropical forest of Bawangling, on dead branches of unidentified broad-leaved tree, 11 Dec 2009, J. Ma (HSAUP H5125).

Comments — *Nakataea,* established by Hara (1939) with *Helminthosporium sigmoideum* Cavara [≡ *N. sigmoidea* (Cavara) Hara] as the type species, is characterized by solitary, apical and lateral conidia seceding rhexolytically from polyblastic, integrated, terminal becoming intercalary, sympodially extending conidiogenous cells. The conidia are falcate, sigmoid, fusiform or obclavate, almost always 3-euseptate, versicolored, end cells paler than the central cells, with a distinct basal frill (Ellis 1971). *Vakrabeeja* Subram. (Subramanian 1956) is based on the same type species as *Nakataea* and therefore a superfluous homotypic synonym. Kirk (1983) suggested that *Nakataea* should be synonymised with *Pyricularia* Sacc., because their type species were morphologically similar and both had *Magnaporthe* teleomorphs. ITS rRNA

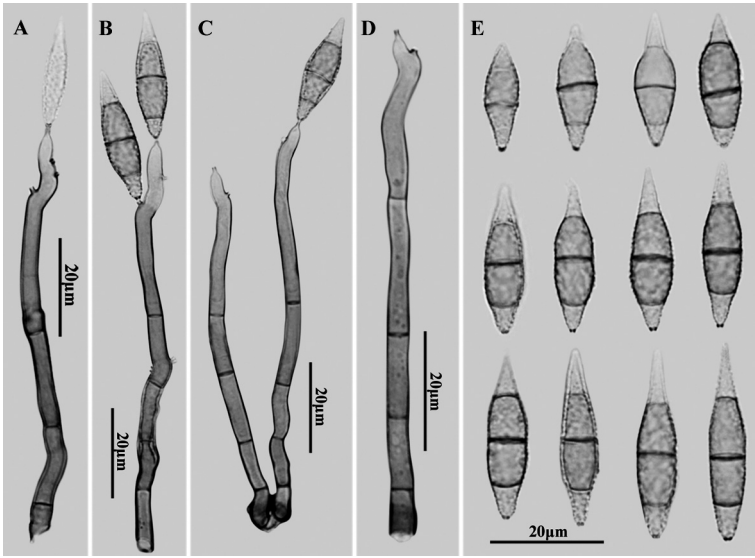

Fig. 3. *Nakataea fusispora*. A–C. Conidiophores, conidiogenous cells with denticles and conidia. D. Conidiophore and conidiogenous cell. E. Conidia.

sequence phylogenetic analyses (Bussaban et al. 2005) suggest that *N. fusispora* is distinct from *Pyricularia* species and should be maintained in *Nakataea*.

Nakataea fusispora is most similar to *N. sigmoidea* (Hara 1939) in conidial shape but can be separated from *N. sigmoidea* (conidia 40–83 × 11–14 μm, smooth) by its smaller conidia with verruculose walls. The conidia of our collection are somewhat wider than cited in the original description by Matsushima (1971; 4.8–6 μm). The conidial length ranges of our and Matsushima's material overlap, and other morphological features of our fungus satisfy the original description of *N. fusispora*. This fungus is reported for the first time from China.

Pseudospiropes costaricensis (E.F. Morris) de Hoog & Arx, Kavaka 1: 59, 1974 ["1973"] Fig. 4

≡ *Pleurophragmium costaricensis* E.F. Morris, Mycologia 64: 893. 1972.

Colonies on natural substratum effuse, brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, smooth-walled hyphae. Conidiophores distinct, single or in groups, erect, unbranched, straight or flexuous, smooth, septate, brown to dark brown, paler toward the apex, 160–290 μm long, 6–9 μm wide. Conidiogenous cells holoblastic, polyblastic, indeterminate, terminal becoming intercalary, pale brown to brown, integrated, always with holoblastic sympodial extensions.

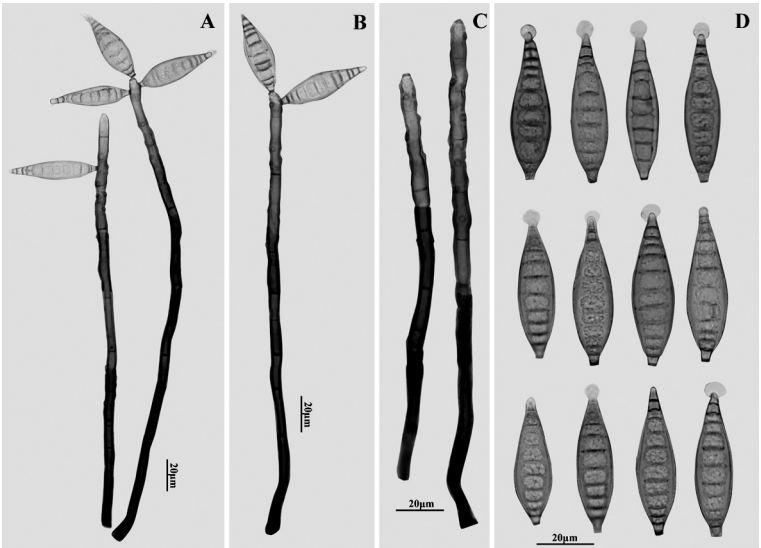

Fig. 4. *Pseudospiropes costaricensis*. A–B. Conidiophores and conidiogenous cells with conidia. C. Conidiophores and conidiogenous cells. D. Conidia.

Conidiogenous loci enlarged, thickened, protuberant and black, lenticular. Conidial secession schizolytic. Conidia apical and lateral, solitary, dry, simple, obclavate or fusiform, pale brown or brown, smooth, 8–11-distoseptate, 40–53 × 11–14 μm, apical cell with a hyaline vesicle, basal cell with a truncate base, 2–3.5 μm.

Specimen examined: **China**, **Guangdong Province**: Chebaling National Nature Reserve, on dead branches of unidentified broad-leaved tree, 19 Oct 2010, J. Ma (HSAUP H5419).

Comments – Since the establishment of *Pseudospiropes* M.B. Ellis, based on *Helminthosporium nodosum* Wallr. [≡ *P. nodosus* (Wallr.) M.B. Ellis], there have been numerous additions to the genus. However, Sinclair et al. (1997) pointed out that *Pseudospiropes* is heterogeneous. Castañeda et al. (2001) reviewed the genus and proposed three new segregate anamorphic genera —*Minimelanolocus* R.F. Castañeda & Heredia, *Nigrolentilocus* R.F.Castañeda & Heredia, and *Matsushimiella* R.F.Castañeda & Heredia— based on the morphology of conidiogenous loci, conidial septation, and conidial secession. As presently constituted, *Pseudospiropes* is characterized by polyblastic, integrated, terminal becoming intercalary, sympodial, cicatrized conidiogenous cells bearing broadly enlarged, thickened, often dark and protuberant scars, and solitary, apical and lateral, distoseptate conidia with schizolytic conidial secession (Ellis 1971, Castañeda et al. 2001). Currently, *Pseudospiropes* contains 13 valid species (Ma et al. 2011).

Pseudospiropes costaricensis was originally assigned to *Pleurophragmium* Costantin and subsequently transferred to *Pseudospiropes* by de Hoog & Arx (1974) due to its cicatrized conidiogenous cells with large, often dark and prominent scars. The conidia of *Pseudospiropes costaricensis* are morphologically similar to those of *P. hachijoensis* Matsush. (Matsushima 1975), *P. josserandii* (Bertault) Iturr. (Iturriaga & Korf 1990), *P. nodosus*, and *P. simplex* (Nees & T. Nees) M.B. Ellis (Ellis 1971). However, *P. costaricensis* can be easily separated from *P. hachijoensis*, *P. josserandii*, *P. nodosus* and *P. simplex* by its conidia, which have a hyaline vesicle at the apex. Except for having more conidial septa, our collection overlaps well with the original description of *P. costaricensis* (Morris 1972; 6–9 septa). This fungus is reported as new to the Chinese mycobiota.

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